Claims:

1. An optical structure for processing optical energy comprising a metal layer having a first surface comprising a plurality of _voids_ having a dimension less ~~that~~ then the wavelength of optical energy being processed.

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2. The structure of Claim 1 wherein said voids are concave and indentations.

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3. The structure of Claim 1 wherein said voids extend from the first surface to a second surface of said metal layer.

4. The structure of Claim 3 wherein said voids are cylindrical holes passing through said metal layer.

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5. The structure of Claim 4 wherein said voids have a diameter of from about 10nm to about 1 micron.

6. The structure of Claim 1 wherein said voids are arranged in an ordered array.

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7. The structure of claim 6 wherein said voids are arranged in a triangular array.

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8. The structure of Claim 7 wherein said voids arranged in an ordered array produce a phase matched effect.

9. The structure of Claim 1 wherein said metal layer is greater than 50nm thick.

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10. The structure of Claim 1 wherein an active material placed adjacent the voids.

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11. The structure of Claim 1 wherein an active material is
    placed inside said voids.

12. The structure of Claim 1 wherein said gain layer is placed
5   on top of said metal layer.

13. The structure of Claim 1 further comprising one or more
    gain layers placed between a substrate and said metal
    layer.

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14. The structure of Claim 1 wherein a non-linear material is
    placed adjacent the voids.

15. The structure of Claim 1 wherein a non-linear material is
15 placed at least partially in the voids.

16. The structure of Claim 15 wherein the non-linear material
    fills the voids.

20 17. The structure of Claim 1 which is in the form of a laser,
    an LED, a wavelength converter, a sensor or a switch.

18. A method for optical processes comprising directing
    optical energy at a first surface of a metal layer, said
25 surface comprising one or more voids having a dimension
    less than the wavelength of the optical energy being
    processed.

19. The method of Claim 18 wherein the voids are formed in the
30 first surface of the metal layer in an ordered array.

20. The method of Claim 18 wherein the voids are filled with a
    gain material.

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21. The method of claim 18 wherein the gain material is
     placed adjacent the voids.

5 22. The method of Claim 18 using a gain layer placed in
        between a substrate layer and a metal layer.

23. The method of Claim 18 wherein the voids are filled with a
     non-linear material.

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24. The method of claim 18 wherein the non-linear material is
     placed adjacent the voids.

25. The method of Claim 18 using a non-linear material placed
15   in between a substrate layer and a metal layer.

26. The method of Claim 18 further comprising optical pumping.

27. The method of Claim 18 further comprising phase matching
20   to form optical second harmonic generation.

28. A laser comprising a metal layer having first surface
     comprising a plurality of voids, said voids having a
     dimension less then the wavelength of optical energy being
25   processed.

29. An LED structure comprising a metal layer having a first
     surface comprising a plurality of voids, said voids having
     a dimension less then the wavelength of optical energy
30   being processed.

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